

503 GROUP





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503 INTERNATIONAL GROUP

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503 group is an international private managerial, specialized and tech-based group of companies operating in the energy sector. Our group functions as a managing company (MC, EPCM and EMC) overseeing projects from concept design to installation and commissioning stages in collaboration with its members. We also manage the export or supply of equipment and materials. The group offers a range of services, providing total solutions to customers in the following sector:

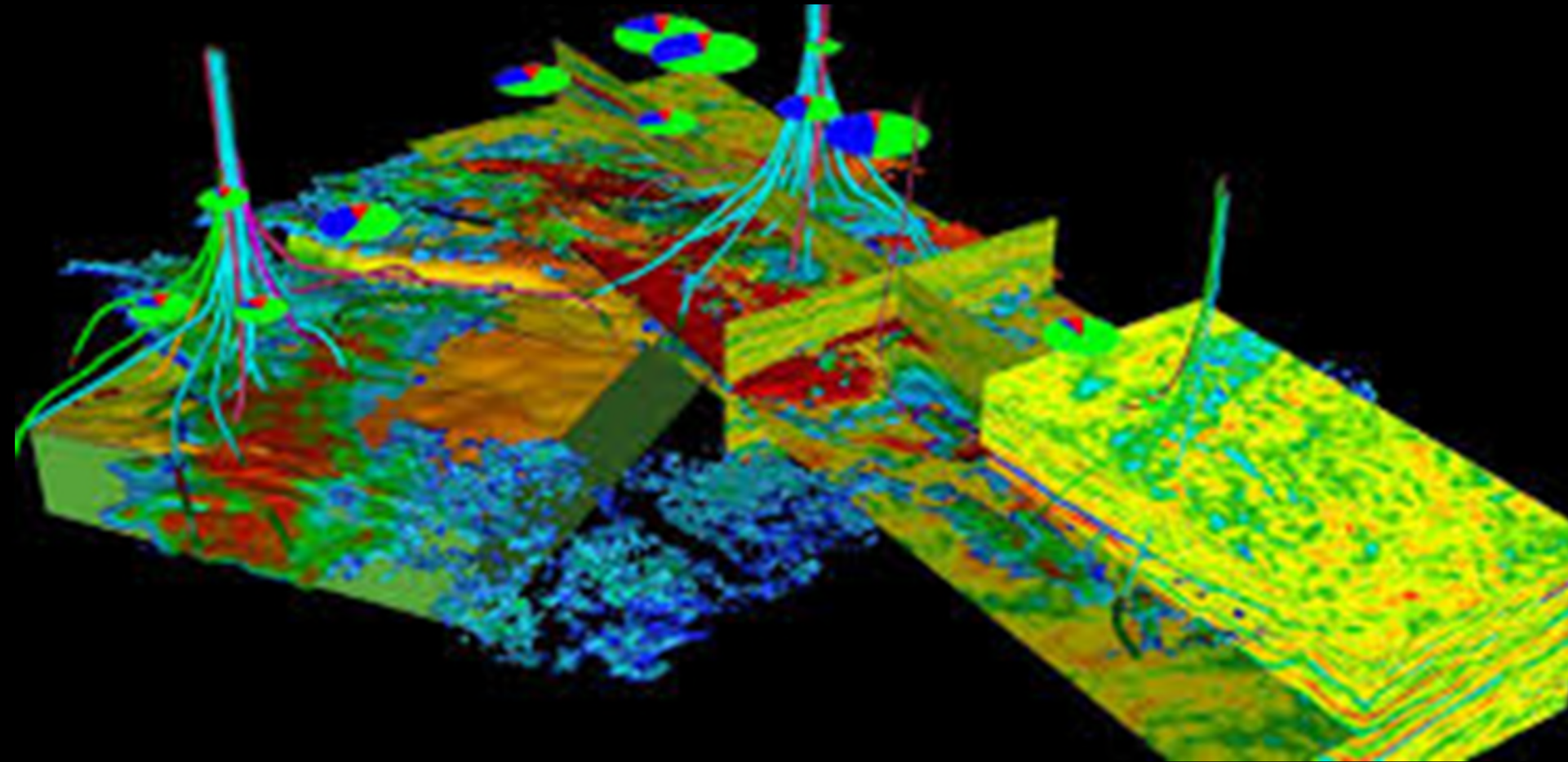
ENERGY SECTOR

Considering the wide range of skills and experiences of the member companies of the group, there is the expertise to develop and manage a variety of projects and services in oil and gas (the upstream, midstream and downstream); electricity generation (generation, distribution and transmission); as well as renewable energy and climate change. We are ready to provide management services; technical & engineering services; and technological, industrial and economic services to customers, partners, organizations and companies. Our members can provide and supply so many equipments for oil and gas industries.

Our group provides comprehensive solutions across all mentioned fields to address enhancing oil & gas production and reduction of electricity shortages



SOME OF THE ITEMS THAT CAN BE COOPERATED WITH ARE AS FOLLOWS:



- Management of the projects definition in oil & gas, refining, petrochemical and power generation industries. Conducting technical and economic feasibility studies (FS) and business plan (BP), commercial & market analysis, values chain development, technology evaluation & management
- Oil field studies and services, oil well services mud logging services



Design, manufacturing and supply various types of valves, such as Gate, Globe, Check, Ball, Needle and Wellhead valves. We have a wide range of 100% European-made ball valves in all types of materials and can adapt to the specifications of our customers to provide tailor-made valves.



Management of construction and reconstruction projects and design and construction of refineries (small and large) and petrochemical units. Review, supervision and management of supply and purchase of used (second-hand) refinery and petrochemical units



CAPABILITIES IN OIL AND GAS PIPELINE

- **Engineering and Design:** Providing conceptual, basic, and detailed design services for industrial projects.
- **Project Management:** Executing projects under Management Contracting (MC) with an emphasis on coordination and quality control.
- **Procurement and Construction:** Supplying materials and equipment required for projects and performing construction operations (PC and C).
- **EPC Projects:** Full execution of projects from engineering to commissioning.
- **Consulting and Supervision:** Offering technical consulting and project execution supervision services



- Design, Manufacturing, service providing and supply high-performance pumps for the oil and gas industry, adhering to API, ANSI, and ISO standards. Their solutions cater to upstream, midstream, and downstream operations, ensuring safety, efficiency, and reliability in extreme conditions. Our Key Offerings are API-Compliant Pumps including centrifugal pumps (API 610) for crude oil handling, refining, and pipeline transport, reciprocating pumps (API 674) for precise high-pressure applications like water injection and chemical metering, mag drive pumps (API 685) for seal-less designs for hazardous fluids.



- Pipeline measurement and adjustment and filtering package, cooling towers, distillation towers, different tanks, electrical equipment, drilling equipment, automation & control instruments, metering instruments, different pipes and fittings, chemicals and catalysts.



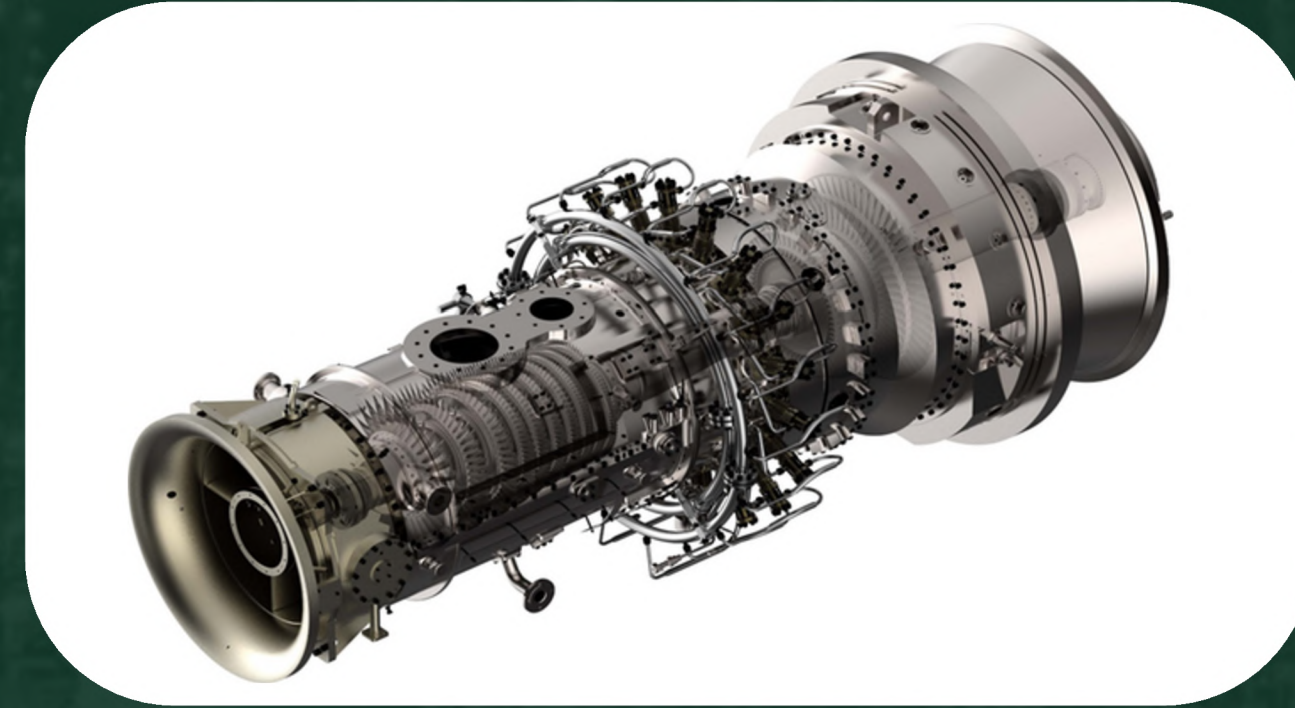
- Commissioning and setting up compressors, turbines, boilers, reformers, and so on systems
- Design, supply, construction and operation of utility systems.
including water and wastewater treatment, electricity, compressed air, etc.
Design, supply, construction and commissioning of natural gas systems, including gas pressure-boosting and reducing stations etc.
Flare Gas recovery and carbon collection and capture



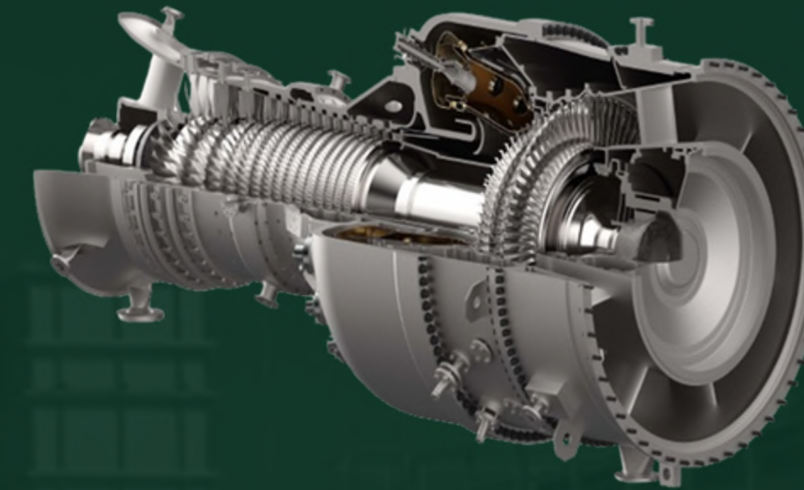
- Reconstruction, repair and restoration or strengthening of corroded oil & oil storage tanks (reserving tanks), pipelines esp. corroded metallic pipes, damaged concrete structures in the oil, gas and refinery & petrochemical industries with advanced composite technology and production of structures with polymer concrete and space structural systems without frame. We have registered 23 patents in the fields of composite technology.



The technical staffs of us are trained and we are under European license in the fields of the strengthening steel and concrete structures against the corrosion and fire. Our technology allows us to repair the structures during the service without any service shut down. Also, we can produce slabs by using of polymer concrete technology.



- Design and manufacturing technology of gas turbines. We offer design and engineering services for gas turbines used in gas compressor stations and power plants. Special focus is laid on the progressive design of the major gas turbine components (compressor, combustion chamber and turbine), auxiliaries and accessories (such as air intake, exhaust and fuel system) considering the highest efficiency, stability, availability and reliability.



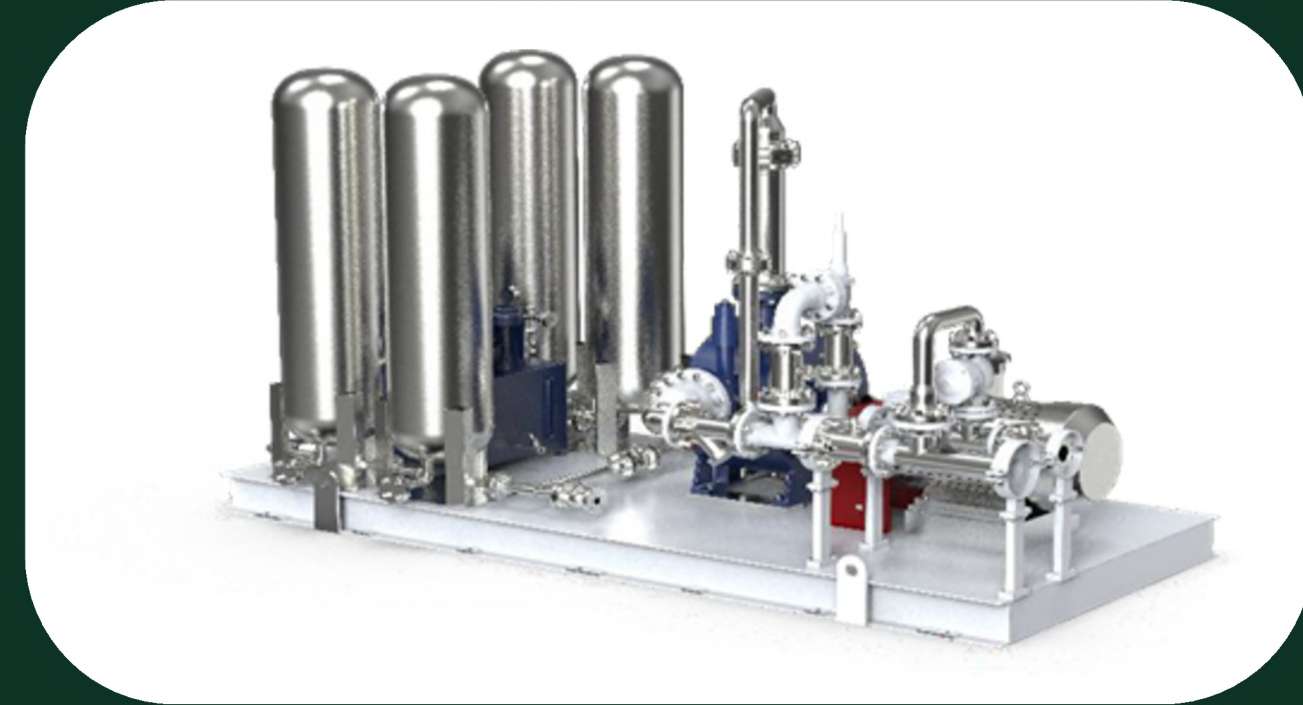
- Design and optimization of power plant or gas compressor station components through application of modern computational tools. By utilizing cutting-edge and high-quality computational tools, especially in-house developed codes for analytical and CFD simulations for combustion, heat transfer, aerodynamic and mechanical analysis.
- Basic design of power plants and gas compressor stations (upstream and midstream sides) for process optimization, best equipment selection and the reaching highest performance regarding ambient conditions and client's requirement. IGT25 Gas turbine design and upgrading (core engine and package) along with failure Analysis of IGT25 gas turbine. Design of NGT150 gas turbine. Long term service agreement to optimize performance and life span of Frame 9 gas turbines. Condition monitoring of Frame 9 gas turbines in power plants.
- After sales service, repair and maintenance are our capabilities. For example, basic, semi-basic, periodical and specific repairs of power plant, industrial boilers, gas and steam turbines, repair and restoration of blades of GE F5, GE F6, Siemens E & F class turbines etc.

WGS MULTIPHASE WET GAS COMPRESSION SYSTEM



1. GENERAL INTRODUCTION:

The core design concept of the WGS Multiphase Wet Gas Compression System integrates the traditional multiphase pumps with rotor profiles of twin-screw compressors, complemented by a heat exchange and replenishment system. The main difference between this multiphase wet gas compression system and traditional multiphase devices lies in its exceptionally strong gas conveying capability. The system is designed to operate smoothly for long periods under conditions of pure gas or pure liquid, as well as under conditions of any gas-liquid ratio.



SYSTEM COMPONENTS:

WGS Multiphase Pump, Motor, Cooling Tanks, Lubrication Oil Station, Inlet and Outlet Pipelines, and Valve Assemblies.

Operating Path of the Device:

The medium enters through the inlet pipeline, passes through pipeline filters, enters the suction chamber of the multiphase pump, is pressurized by the pump, passes through safety valves, check valves, ball valves, and finally exits through the outlet pipeline. The medium can be pure gas, pure liquid, or a mixture at any gas-liquid ratio (GVF).

A check valve is installed between the inlet and outlet pipelines of the device. When the ball valves of the inlet and outlet pipelines are closed, the medium can flow directly from the inlet to the outlet pipeline through the check valve. In other words, when the inlet and outlet ball valves are closed, this segment effectively functions as a bypass (provided that the inlet pressure is higher than the pressure in the outlet pipeline).

2. DESIGN FEATURES:

Pump Body:

The multiphase pump utilizes an enlarged pump body, internally designed to store a portion of liquid medium. When the incoming medium is a gas-liquid mixture, the gas is compressed and discharged, while the liquid is regulated by flow control valves pre-adjusted inside the pump body. The liquid then returns from the discharge chamber of the pump to the suction chamber, continuously circulating within the pump. These liquids serve to lubricate the rotors and act as the liquid seal required between the rotors during dry operation, effectively sealing the rotor clearances.

Driver:

For the test apparatus, a 90KW, 4-pole motor with a speed of 1450rpm was selected. Based on the operating conditions provided by the client, we offer options such as explosion-proofing and variable frequency speed regulation to adapt to various operational requirements.

Cooling Tank:

Each unit is equipped with four vertical cooling tanks (connected in series), storing a large amount of cooling liquid mainly used for heat dissipation of the device. When the pumped medium is pure gas or a mixture with a very high GVF value, the compression of the gas by the multiphase pump generates a large amount of heat. After heat exchange in the cooling tanks, the heat is carried away by the air, allowing the system to reach thermal equilibrium and ensure safe production.

Lubricating Oil System:

The WGS Multiphase Wet Gas Compression System is equipped with a mechanical seal lubrication oil station according to API standards. The lubricating oil from the station enters the double-end face seals of the pump through pipelines, flushing and lubricating the mechanical seals while also dissipating the heat generated by the mechanical seals.



3. TESTING RESULT:

The designed flow rate of the test unit is 120 m³/h (motor speed 1450 rpm). After the testing, when the inlet pressure is zero, the outlet pressure can reach 25 bar. The actual gas compression ratio is as high as 26 times, and the performance of the device has reached an industry-leading level.

4. Industries:

The WGS Multiphase Wet Gas Compression System is suitable for various applications in the petroleum and natural gas industries, which is suitable for various applications including:

- A. Normal production and transportation in oil fields.
- B. Normal production and transportation in gas fields.
- C. Production and transportation in oil fields with extremely high gas or water content.
- D. Production and transportation in gas fields with water content.

In summary, the WGS Multiphase Wet Gas Compression System is a versatile device for petroleum and natural gas production and transportation. It can operate steadily for a long time regardless of changes in the multiphase flow at the inlet. Compared with traditional compressors, this system greatly reduces the heavy upstream infrastructure and saves a significant amount of maintenance costs.

5. Key Meanings:

A. Increased production from oil and gas wells:

Over time, liquid accumulation inside oil and gas wells can severely affect production. By using the WGS Multiphase Wet Gas Compression System in bypass mode connected to the outlet pipeline of gas wells, the system reduces wellhead pressure, captures liquid and gas in the pipeline, and gradually restores normal production from oil and gas wells.

B. Boosting transportation:

After pumping the production from downhole pumps to the surface, the decrease in pressure differential limits the distance the production can be transported. With the WGS Multiphase Wet Gas Compression System, the production from wells can be boosted for long-distance transportation.

6. Preparation for Startup:

- A. Check all pipeline connections, ensure everything is in order, then check power supply and electrical connections.
- B. Fill the four cooling tanks with cooling liquid using fire water pipes.
- C. Start the lubricating oil station to flush the mechanical seals and ensure they are lubricated.
- D. Determine the rotation direction of the motor.
- E. Open the ball valves on the inlet and outlet pipelines; subsequently, control the outlet pressure by adjusting the outlet ball valve.



ADVANCED PLAN FOR FLARE GAS COLLECTION USING SKID-MOUNTED SYSTEMS IN THE OIL AND GAS INDUSTRY

1. INTRODUCTION

Flare gas, a byproduct of oil and gas operations, consists of waste gases traditionally burned off to manage excess production or ensure safety. However, flaring contributes significantly to greenhouse gas emissions, releasing methane (CH₄), carbon dioxide (CO₂), and other pollutants. Advanced flare gas collection systems, particularly skid-mounted solutions, offer an environmentally and economically viable alternative by capturing and repurposing these gases. This plan outlines the design, equipment, costs, suppliers, and applications of skid-mounted flare gas collection systems, tailored for the oil and gas industry.

2. OBJECTIVES

- Reduce greenhouse gas emissions by capturing flare gas.
- Convert waste gas into valuable products or energy.
- Ensure compliance with environmental regulations, such as the U.S. EPA's Methane Emissions Reduction Program.
- Optimize operational efficiency using modular, skid-mounted systems.

3. FLARE GAS COLLECTION SKID SYSTEM DESIGN

3.1 OVERVIEW OF SKID-MOUNTED SYSTEMS

Skid-mounted flare gas collection systems are modular, self-contained units built on a steel frame for easy transportation and installation. These systems integrate multiple components to capture, process, and condition flare gas, making them ideal for remote oilfield operations or facilities with variable gas flow rates. Their modular nature allows rapid deployment, scalability, and minimal onsite construction.



3.2 KEY EQUIPMENT COMPONENTS

The following components are integral to a flare gas collection skid, designed to handle gas compositions typically including methane, LPGs, and trace sulfur compounds:

Component	Description	Estimated Cost (USD)
Knockout Drum	Removes liquid hydrocarbons and water from the gas stream to prevent downstream equipment damage. Typically designed to ASME BPVC standards.	20,000–50,000
Liquid Ring Compressor	Compresses volatile flare gas for further processing. Robust for handling hazardous gases, with capacities ranging from 100 to 1,000 scfm.	50,000–150,000
Gas Scrubber	Removes solid and liquid contaminants, ensuring clean gas for processing. Includes coalescing filters for fine particulate removal.	15,000–40,000
Mechanical Refrigeration Unit (MRU)	Cools gas to -5°C to -70°C to condense natural gas liquids (NGLs) for separation.	100,000–250,000
Fractionator	Separates NGLs into marketable products like propane and butane. Optional for high-value product extraction.	80,000–200,000
Control System (PLC-Based)	Automates process control with pressure, temperature, and level transmitters. Includes emergency shutdown valves.	25,000–60,000
Skid Frame specifications	Steel frame meeting offshore or onshore specifications, designed for portability and durability.	10,000–30,000

Table 1: Key equipment components of a flare gas collection skid.



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503 group provides additional information about each of the products and services and performs based on client's order and request.

We invite you to explore the offerings and get in touch to learn more about how our capabilities can meet your specific requirements. Together we can shape effectively a healthier and secure future through our bilateral win-win business development.

THANK YOU